

Notes on the genera *Parahya* Beier and *Stenohya* Beier (Pseudoscorpionida: Neobisiidae)

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Summary

The pseudoscorpion genera *Parahya* Beier and *Stenohya* Beier are transferred from the Hyidae to the Neobisiidae. *Obisium submersum* Bristowe is treated as a senior synonym of *Parahya pacifica* Beier. *Stenohya* is treated as a senior synonym of *Levigatocreagris* Čurčić, and the following new combinations are made: *Stenohya caelata* (Callaini), *S. gruberi* (Čurčić), *S. hamata* (Leclerc & Mahnert), *S. heros* (Beier), *S. kashmirensis* (Schawaller), *S. lindbergi* (Beier) and *S. martensi* (Schawaller). *Parahya submersa* and *Stenohya vietnamensis* Beier are redescribed.

Introduction

The pseudoscorpions currently assigned to the family Hyidae are very poorly known, and only seven Indo-Pacific species in four genera have been described (Harvey, 1991). Whilst undertaking a review of the family (Harvey, in press), it became clear that although *Hya* Chamberlin and *Indohya* Beier were closely related and should be retained in the Hyidae, the other two genera, *Parahya* Beier and *Stenohya* Beier, were incorrectly assigned to the family by Beier (1957, 1967) and belong to the Neobisiidae. The results of the study on these two genera are presented here. It is also shown that the type species of *Parahya*, *P. pacifica* Beier, is a junior synonym of *Obisium submersum* Bristowe, and that *Stenohya* is a senior synonym of the neobisiid genus *Levigatocreagris* Čurčić.

Materials and Methods

Specimens were borrowed from the following institutions: British Museum (Natural History), London (BMNH), Bishop Museum, Honolulu (BPBM), Muséum National d'Histoire Naturelle, Paris (MNHP), and United States National Museum, Washington D.C. (USNM).

Specimens were mounted on microscope slides in Euparal, or cleared in lactic acid and temporarily examined in glycerol. Slide mounted specimens are denoted "SL", and those in spirit are denoted "SP". Terminology basically follows Chamberlin (1931).

Family NEOBISIIDAE Chamberlin

Genus *Parahya* Beier

Parahya Beier, 1957: 15. Type species *Parahya pacifica* Beier, 1957 (junior synonym of *Obisium submersum* Bristowe, 1931), by original designation.

Diagnosis

Parahya is distinguished from all other pseudoscorpion genera by the morphology of the arolium (Fig. 8).

Remarks

Beier (1957) placed this genus in the Hyidae, but examination of the available material clearly indicates that the venom apparatus is lacking from the movable chelal finger (Fig. 1). In addition, trichobothrium *t* is not lanceolate, as in most Syarinidae (the only other neobisioid family with a venom apparatus solely in the fixed chelal finger) (Muchmorè, 1982). Taken together, these character states conform with the current diagnosis of the Neobisiidae, to which this genus is transferred.

Parahya submersa (Bristowe) (Figs. 1-12)

Obisium submersum Bristowe, 1931: 465, figs. 3-6.

Parahya pacifica Beier, 1957: 15-16, figs. 4b, 5; Harvey, 1991: 315.

NEW SYNONYMY.

Parahya submersa (Bristowe): Harvey, 1991: 315.

Types

Obisium submersum: lectotype ♂ (present designation), Singapore, Bristowe (BMNH 1991.4.19.1; SL). Paralectotype ♂, same data as lectotype (BMNH 1991.4.19.2; SL).

Parahya pacifica: holotype ♂, Yap Island, Caroline Islands, beach, sea, 1 July 1950, R. J. Goss (USNM, 2245; SL).

Other material examined

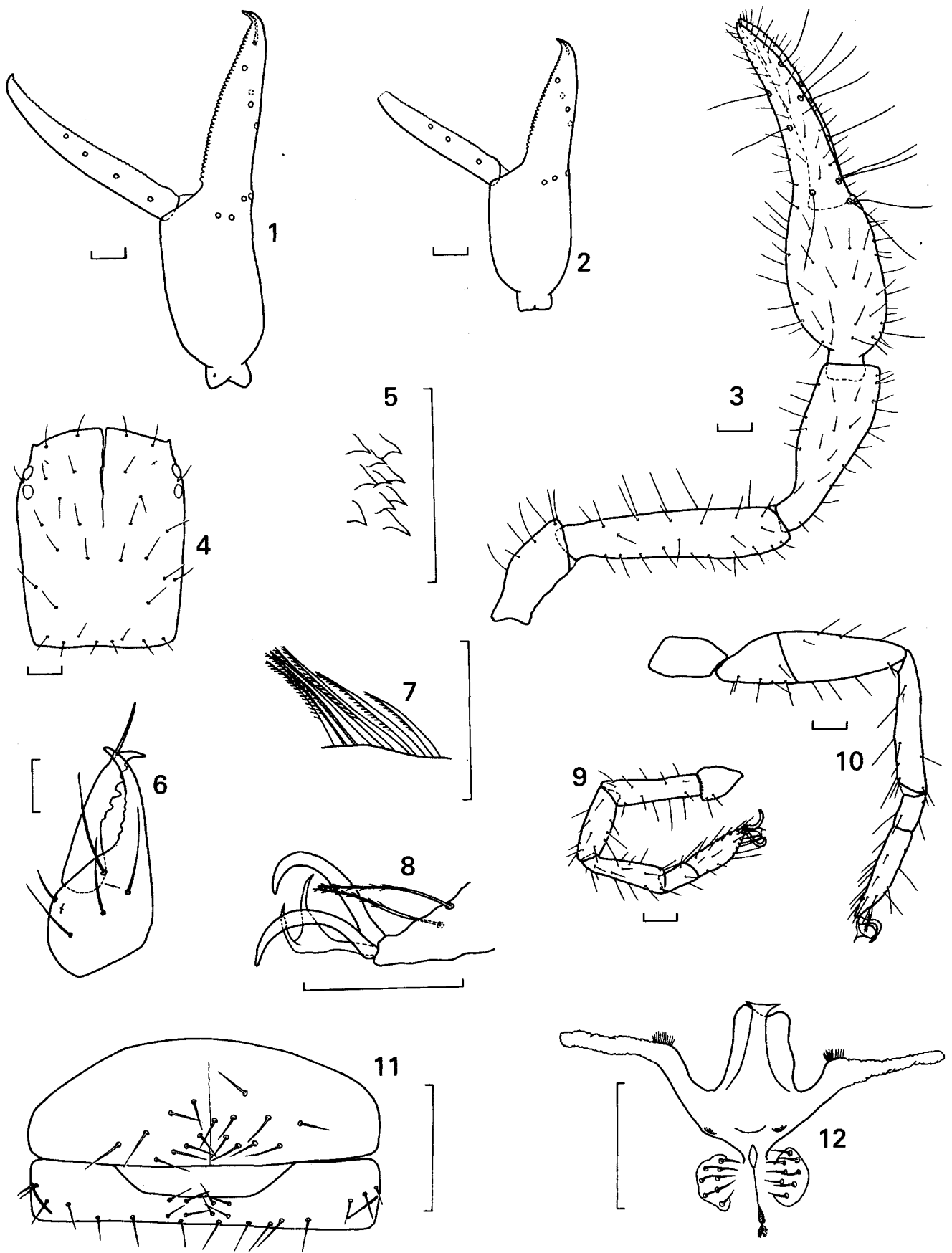
NEW CALEDONIA: 1 ♂, Baie de Saint-Vincent, Ilot Petit-Tenia, dans la zone supérieure de l'estran (zone a gros chiton), 26 September 1961, Y. B. Plessis (MNHP; SL); 1 tritonymph, Saint-Vincent, Y. B. Plessis (MNHP; SP); 1 tritonymph, "Ilot Croissant au vent, 19/2" (MNHP; SL).

Diagnosis

As for genus.

Description

Adult male: Colour light red-brown. Setae long, straight and acicular. Pedipalp (Fig. 3): trochanter 2.47-2.53, femur 4.63-4.73, tibia 2.80-2.95, chela (with pedicel) 3.83-3.97, chela (without pedicel) 3.59-3.69, hand 1.38-1.61 times longer than broad, movable finger 1.30-1.58 times longer than hand. Fixed chelal finger with 8 trichobothria, movable chelal finger with 4 trichobothria (Fig. 1): *eb* and *esb* separated by 1 areolar diameter; *isb* anterior to these; *ib* dorsal to *isb*; *ist* near *it*; *b*, *sb* and *st* equidistant; *st* closer to *t* than to *sb*. Venom apparatus present only in fixed chelal finger, venom duct very short, terminating in nodus ramosus well before reaching *et*. Chelal teeth contiguous: fixed finger with 39-44 teeth; movable finger with 45-47 teeth. Chelicera (Fig. 6): with 5 setae on hand, *es* small; movable finger with 1 seta; galea very slender; fixed finger with 8 small teeth; movable finger with 5 large teeth; flagellum (Fig. 7) of 7 serrate blades; lamina exterior absent. Carapace (Fig. 4) 1.24-1.29 times longer than broad; lateral margins slightly convex; with 4 eyes, anterior pair with lens, posterior pair represented by eyespots; without epistome; lectotype



Figs. 1-12: *Parahya submersa* (Bristowe), lectotype male, unless otherwise stated. **1** Left chela, lateral; **2** Left chela, lateral, tritonymph; **3** Right pedipalp, dorsal; **4** Carapace (damaged); **5** Pleural membrane; **6** Chelicera, paralectotype male; **7** Flagellum, male from New Caledonia; **8** Distal tip of leg showing arolium, claws and subterminal setae, other setae omitted, paralectotype male; **9** Leg I; **10** Leg IV, holotype male, *P. pacifica*; **11** Genital opercula, holotype male, *P. pacifica*; **12** Genitalia, holotype male, *P. pacifica*. Scale lines = 0.1 mm.

with 32 setae, with 4 on anterior margin and 8 on posterior margin, similar in other specimens, posterior margin with 8-12 setae; without furrows. Tergites and sternites undivided, except for genital opercula which are incompletely divided (Fig. 11); tergites and sternites (with the exception of tergite I and the anterior sternites) biseriate. Tergal chaetotaxy: 8: 13-14: 17-19: 20-22: 22-23: 23: 22-27: 20-27: 23-27: 14-25: 20: 2. Sternal chaetotaxy: 17: (3)17-20[16](3): (2-3)16-18(2-3): 26: 27: 23-30: 28: 23-29: 17: ?: 2. Pleural membrane somewhat papillate, each protuberance pointed. Coxal chaetotaxy: 7: 6: 6: 8; pedipalpal coxa with 2 apical setae. Posterior maxillary lyrifissure present. Genitalia (Fig. 12) very simple, with numerous setae within genital atrium. Spiracles simple, with spiracular helix; anterior spiracular plates with 3 setae, posterior plates with 2-3 setae. Legs (Figs. 8-10): basifemur I and II without basal swelling; basifemur I longer than telofemur I; suture line between basifemur IV and telofemur IV oblique; basitarsus shorter than telotarsus; subterminal tarsal setae finely serrate; arolium (Fig. 8) with distal extensions, shorter than claws; claws slender and simple.

Dimensions (mm): Body length 2.2-2.3. Pedipalps: trochanter 0.37-0.40/0.15-0.16, femur 0.70-0.75/0.15-0.16, tibia 0.56-0.62/0.20-0.22, chela (with pedicel) 1.11-1.26/0.29-0.31, chela (without pedicel) 1.04-1.17, hand length 0.40-0.54, movable finger length 0.63-0.75. Chelicera 0.39-0.45/0.16-0.20, movable finger length 0.26-0.30. Carapace 0.62-0.70/0.51-0.56. Leg I: trochanter 0.13-0.14/0.10-0.11, basifemur 0.29-0.30/0.08-0.09, telofemur 0.23-0.24/0.08-0.09, tibia 0.27-0.28/0.07, basitarsus 0.11-0.12/0.07, telotarsus 0.21-0.22/0.07. Leg IV: trochanter 0.20-0.23/0.11-0.13, basifemur 0.25-0.27/0.15-0.16, telofemur 0.40/0.15-0.16, tibia 0.46-0.48/0.09, basitarsus 0.13-0.14/0.07-0.08, telotarsus 0.28-0.32/0.07.

Tritonymph: Pedipalps: trochanter 2.23, femur 3.77, tibia 2.29, chela (with pedicel) 3.36, chela (without pedicel) 2.92, hand 1.40 times longer than broad. Fixed chelal finger with 7 trichobothria, movable chelal finger with 3 trichobothria (Fig. 2); *isb* and *sb* absent. Chelicera with 5 setae on hand; 1 on movable finger. Carapace 1.36 times longer than broad; 4 eyes. Legs as in adult.

Dimensions (mm): Pedipalps: trochanter 0.29/0.13, femur 0.49/0.13, tibia 0.39/0.17, chela (with pedicel) 0.84/0.25, chela (without pedicel) 0.73, hand length 0.35, movable finger length 0.48. Carapace 0.49/0.36.

Remarks

The recent transfer of *Obisium submersum* Bristowe to *Parahya* (Harvey, 1991) was first suggested to me by Mr Mark Judson (Leeds), and confirmed by the examination of the two type specimens held in BMNH. Comparison of these types with that of *P. pacifica* confirms their conspecificity. The measurements given for *P. pacifica* by Beier (1957) are substantially smaller than those I observed for the holotype (e.g. pedipalpal femur length 0.64 versus 0.71mm). Comparison of the male genitalia from the different areas was not possible owing to the poor state of the type material from

Singapore and the male from New Caledonia. Beier (1957) described the arolium of *P. pacifica* as having "bristle-like appendages". The protuberances of the arolia are simply extensions, and not separate entities.

Bristowe (1931) indicated that he had collected *P. submersa* from Singapore and Pulau Renggis, but the only two specimens in BMNH are labelled "Singapore". They are in poor condition, and were remounted for the present study. One has been selected as lectotype.

All known specimens of *P. submersa* have been collected in seashore habitats, and the wide distribution of the species (Singapore, Caroline Islands and New Caledonia) presumably reflects an ability to disperse with the aid of ocean currents. The species may eventually be found to have an even wider distribution in the western Pacific region.

Genus *Stenohya* Beier

Stenohya Beier, 1967: 343-344. Type species *Stenohya vietnamensis* Beier, 1967, by original designation.

Levigatocreagris Čurčić, 1983: 34-35. Type species *Levigatocreagris gruberi* Čurčić, 1983, by original designation. NEW SYNONYMY.

Diagnosis

Trichobothrium *ist* situated midway between *ib* and *it*, and far removed from *et*, *est* and *it* (which are grouped together distally) and *eb*, *esb*, *isb* and *ib* (which are grouped together basally).

Remarks

Originally placed in the Hyidae, *Stenohya vietnamensis* lacks the characteristics of that family (Harvey, in press). However, it clearly belongs in the Neobisiidae owing to the presence of a venom apparatus only in the fixed chelal finger and a non-lanceolate trichobothrium *t* (Fig. 14).

Despite the lack of adults of *Stenohya vietnamensis*, comparisons with other neobisiid genera are possible based on the trichobothrial pattern of the tritonymph (Fig. 14). The adult pattern of the fixed chelal finger in neobisioids (and other taxa) differs from that of the tritonymph by the addition of trichobothrium *isb*; comparisons with other neobisioids reveal that *isb* will be situated slightly antero-dorsal to *esb*. The relative positions of the other trichobothria may change slightly, but the overall pattern should remain fairly constant. The trichobothrial pattern differs from most other neobisiid genera by the extreme isolation of *ist*, and the close proximity of *et*, *est* and *it* on the distal margin of the fixed finger, and of *eb*, *esb*, *isb* and *ib* on the basal margin of the fixed finger. In this regard it is very similar to most species of *Levigatocreagris* Čurčić (see Beier, 1959: fig. 5; Callaini, 1990: fig. 2d; Čurčić, 1983: fig. 23; Schawaller, 1987: fig. 14; Schawaller, 1988: fig. 3), but not to *L. hamatus* Leclerc & Mahnert (1988) in which *ist* is situated distally near *it*. In most other neobisiids that possess a galea (i.e. those taxa excluded from the Neobisiinae), *ist* is situated near *ib*. Indeed, the pattern seen in *S. vietnamensis* is very similar to the tritonymphs of *L. lindbergi* (Beier, 1959:

fig. 5) and *L. gruberi* Ćurčić [Schawaller, 1983: fig. 7, as *Microcreagris kaznakovi* (Redikorzev)].

Therefore, I regard *Stenohya* as a senior synonym of *Levigatocreagris*, which contains the following species:

Stenohya vietnamensis Beier, 1967

Stenohya caelata (Callaini, 1990), NEW COMBINATION

Stenohya gruberi (Ćurčić, 1983), NEW COMBINATION

Stenohya hamata (Leclerc & Mahnert, 1988), NEW COMBINATION

Stenohya heros (Beier, 1943), NEW COMBINATION

Stenohya kashmirensis (Schawaller, 1988), NEW COMBINATION

Stenohya lindbergi (Beier, 1959), NEW COMBINATION

Stenohya martensi (Schawaller, 1987), NEW COMBINATION

Known species of *Stenohya* are restricted to montane areas of continental Asia from Afghanistan to Vietnam.

Stenohya vietnamensis Beier (Figs. 13-16)

Stenohya vietnamensis Beier, 1967: 345, fig. 4; Tenorio & Muchmore, 1982: 383; Harvey, 1991: 315.

Types

Holotype tritonymph, 6 km S. of Da Lat, 1400-1500m, Vietnam, 9 June-7 July 1961, N. R. Spencer (BPBM, 7419; SP). Paratype: 1 deutonymph (left chela only), Mt Lang Bian, 1500-2000m, Vietnam, 19 May-8 June 1961, N. R. Spencer (BPBM; SP).

Diagnosis

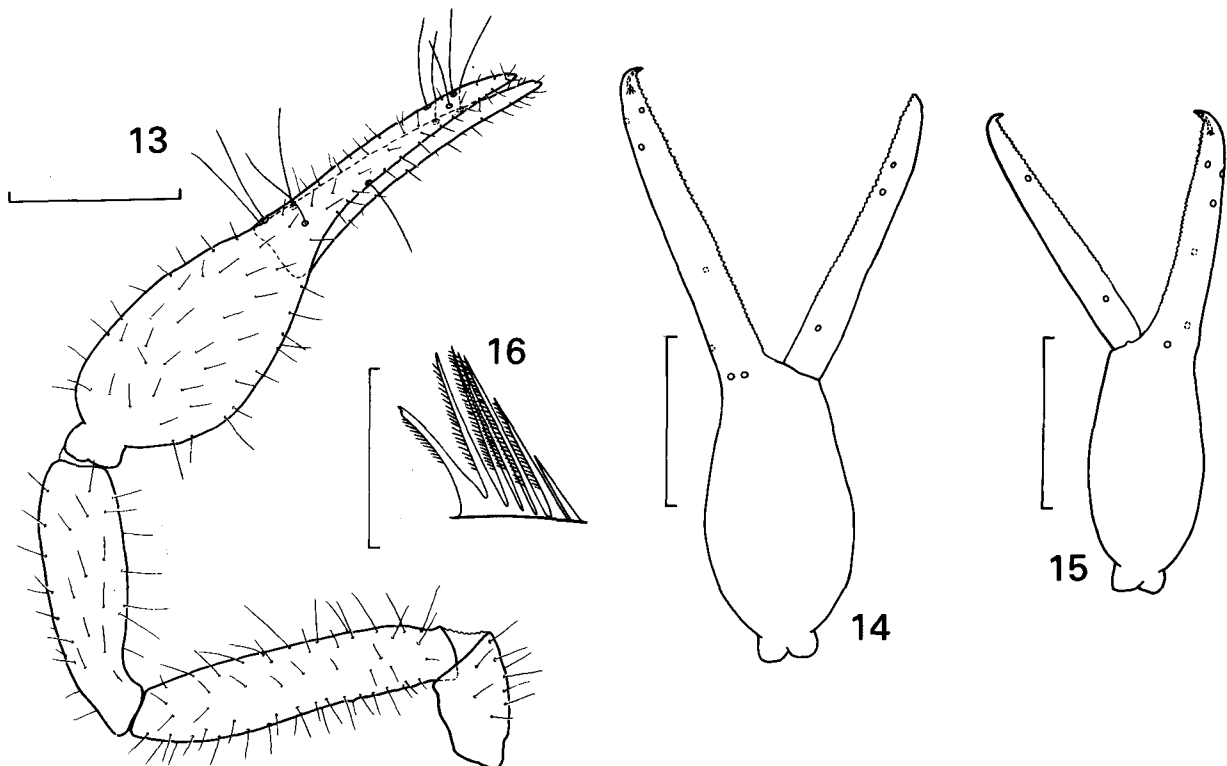
Relatively small (e.g. pedipalpal femur length of tritonymph 1.07mm) and with slender chelal segments

(e.g. hand of tritonymph 1.60 times longer than broad). See also Remarks (below).

Description

Tritonymph: Colour red-brown. Setae long, straight and acicular. Pedipalps (Fig. 13): trochanter 1.75, femur 4.65, tibia 3.22, chela (with pedicel) 3.68, chela (without pedicel) 3.53, hand 1.60 times longer than broad. Fixed chelal finger with 7 trichobothria, movable chelal finger with 3 trichobothria (Fig. 14); *isb* and *sb* absent. Venom apparatus present only in fixed chelal finger, venom duct very short, terminating in nodus ramosus well before reaching *et*. Chelal teeth contiguous. Chelicera with 6 setae on hand, 1 on movable finger; galea slender, distally branched; fixed finger with 16 small teeth; movable finger with 8 small teeth; flagellum (Fig. 16) of 7 serrate blades; lamina exterior absent. Carapace 1.13 times longer than broad; lateral margins slightly convex; with 4 eyes, anterior pair with lens, posterior pair represented by eyespots; without epistome; without furrows. Tergites and sternites undivided. Pedipalpal coxa with 4 apical setae. Posterior maxillary lyrifissure present. Spiracles simple, with spiracular helix. Legs: basifemur I and II without basal swelling; basifemur I longer than telofemur I; suture line between basifemur III and telofemur III oblique; basitarsus shorter than telotarsus; subterminal tarsal setae finely serrate; arolium shorter than claws; claws slender and simple.

Dimensions (mm): Pedipalps: trochanter 0.42/0.24, femur 1.07/0.23, tibia 0.87/0.27, chela (with pedicel) 1.73/0.47, chela (without pedicel) 1.66, hand length 0.75, movable finger length 0.96. Carapace 0.79/0.70.



Figs. 13-16: *Stenohya vietnamensis* Beier, holotype tritonymph, unless stated otherwise. **13** Left pedipalp, dorsal; **14** Right chela, lateral; **15** Left chela, lateral, paratype deutonymph; **16** Flagellum. Scale lines = 0.5mm (Figs. 13-15), 0.1mm (Fig. 16).

Deutonymph: Chela (with pedicel) 4.00, chela (without pedicel) 3.82, hand 1.82 times longer than broad. Fixed chelal finger with 6 trichobothria, movable chelal finger with 2 trichobothria (Fig. 15); *esb*, *isb*, *sb* and *st* absent.

Dimensions (mm): Chela (with pedicel) 1.52/0.38, chela (without pedicel) 1.45, hand length 0.69, movable finger length 0.84.

Remarks

The lack of adults precludes definitive comparisons with most other *Stenohya* species. However, the following observations may be made: it differs from *S. hamata* tritonymphs in the position of *ist* and by its slightly larger size; and from *S. caelata*, *S. gruberi*, *S. heros*, *S. lindbergi* and *S. martensi* by its much smaller size. It appears to be most similar in size to *S. kashmirensis*, but differs by possessing more slender chelae.

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Addendum

Since the manuscript was submitted for publication further specimens of *Parahya submersa* have been examined: SINGAPORE: 3 ♂, 3 ♀, 2 tritonymphs, 1 deutonymph, Labrador Beach, under rocks on sand, half way down littoral zone, 18 Nov. 1990, J. M. Waldo and J. Koh (Western Australian Museum); CAROLINE ISLANDS: 1 ♂, Ifaluk Atoll, beneath boulders on seaward reef, 31 Oct. 1953, Pacific Atoll Survey Team (W. B. Muchmore collection); INDONESIA: *Sulawesi*: 1 ♀, Pulau Batu Daka, near Tumbulawa, below log on mud at around mid-tide level in mangrove, 2 Sept. 1987, D. T. Bilton (W. B. Muchmore collection).